[Weight : 5%]

Exercise 002.1: Newton's First Law

1) A 4 kilogram if moving horizontally with a speed of $8ms^{-1}$, how much net force is required to keep the object moving at this speed and in the same direction?

2) If the net force acting upon a body is balanced then…

True or False:

a) The body must not be moving.

b) The body must be moving with a constant velocity.

c) The body must not be accelerating.

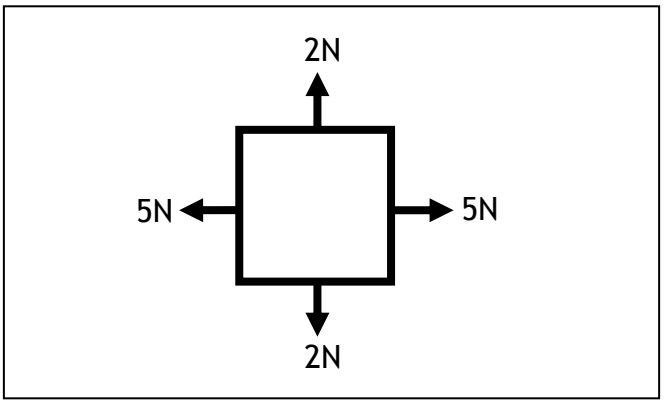
3) What is the force in Newtons exerted by gravity on 1 kilogram?

4) What is the force in Newtons exerted by gravity on 5 kilograms?

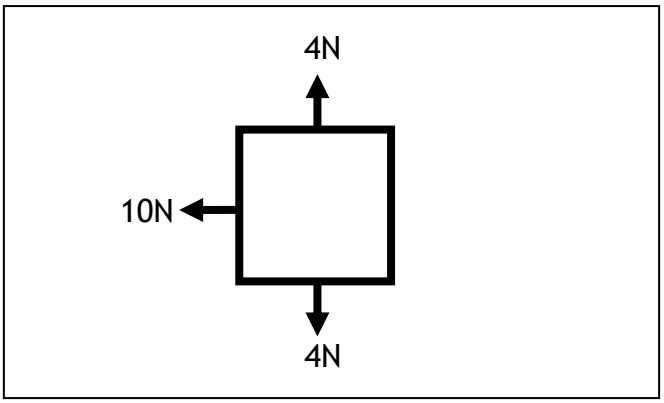
5) What is the force in Newtons exerted by gravity on 70 kilograms?

Exercise 002.2: Free Body Diagrams

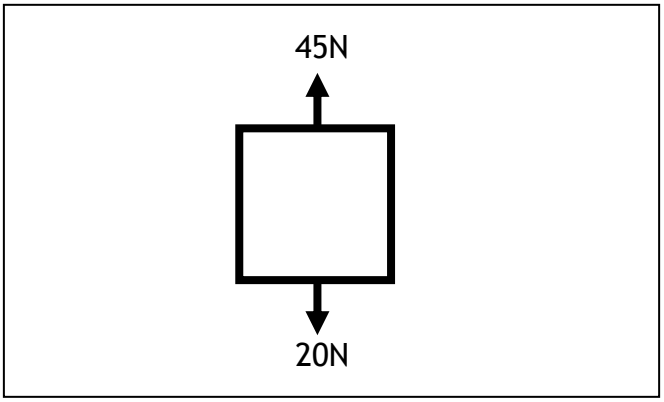
1) Given the free body diagram below, what is the net force acting upon the body? Remember magnitude and direction is required!



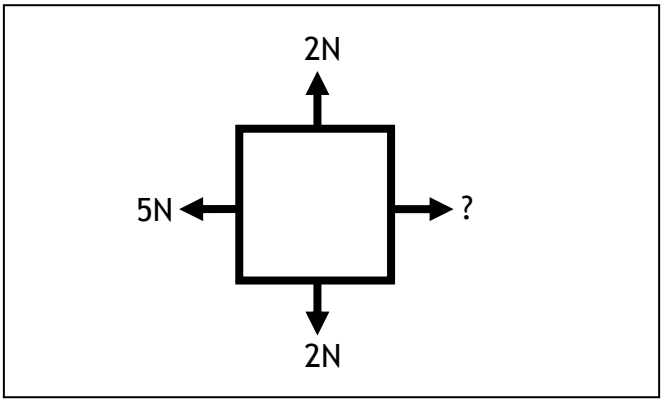
2) Given the free body diagram below, what is the net force acting upon the body?



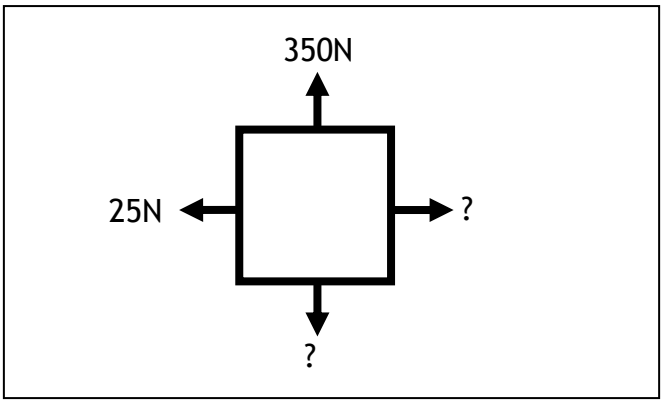
3) Given the free body diagram below, what is the net force acting upon the body?



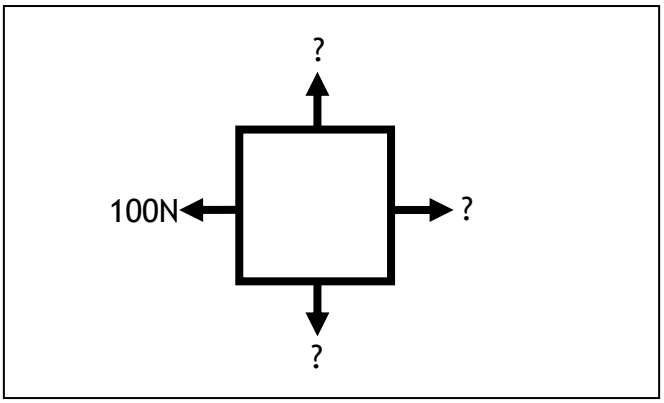
4) Given the free body diagram below, and the net force of 0 Newtons, what is magnitude of the unknown force?



5) Given the free body diagram below, and the net force of 60 Newtons left, what is magnitude of the unknown forces?



6) Given the free body diagram below, and the net force of 200 Newtons, what is magnitude of the unknown forces?



Exercise 002.3: Newton's Second Law

1) What is the acceleration of a 3-kilogram object when a 12 Newton force acts upon the body?

2) What is the acceleration of a 6-kilogram object when a 12 Newton force acts upon the body?

3) A net force of 15 Newtons is exerted on a textbook to cause it to accelerate at a rate of 5 m/s^2. Determine the mass of the textbook.

4) Suppose that a car is accelerating at a rate of 2 m/s^2. If the net force is tripled and the mass is doubled, then what is the new acceleration of the car?

Exercise 002.4: Newton's Third Law

1) While driving down the road, an insect hit the windscreen of a car. As a result, the insect is squashed on windscreen. The insect hits the car and the car hits the insect. Which of the two forces is greater, the force on the insect or the force on the car?

2) A gun recoils when fired. The recoil is the result of action-reaction force pairs. A gunpowder explosion creates hot gases that expand outward allowing the gun to push forward on the bullet. The bullet pushes backwards upon the rifle. The acceleration of the recoiling gun is greater, smaller, or the same as the acceleration on the bullet?

3) If a bowling ball pushes a pin leftward, what is accompanying the action-reaction pair force?